

What is claimed is:

1. A composition of matter for delivering and/or affixing a stem cell to a target tissue comprising a first moiety that specifically binds to the stem cell surface operably affixed to a second moiety that specifically binds to the surface of a cell in the tissue.
2. The composition of claim 1, wherein the first and second moieties are antigen-binding portions of an antibody.
3. The composition of claim 2, wherein the antigen-binding portions are Fab fragments.
4. The composition of claim 1, wherein the composition comprises a bi-specific antibody.
5. The composition of claim 1, wherein the composition comprises a single polypeptide chain comprising the first and the second moieties.
6. The composition of claim 1, wherein the composition comprises a recombinantly produced polypeptide chain.
7. The composition of claim 1, wherein the first and second moieties are affixed via a chemical moiety.
8. The composition of claim 1, wherein the first and second moieties are affixed via a polypeptide moiety.

9. The composition of claim 1, wherein the stem cell is mammalian.
10. The composition of claim 9, wherein the stem cell is a CD34⁺ cell.
11. The composition of claim 9, wherein the stem cell is an embryonic stem cell.
12. The composition of claim 1, wherein the target tissue is selected from the group consisting of hepatic tissue, epithelial tissue, connective tissue, articular tissue, bone tissue, muscle tissue, neuronal tissue, skin, endothelial tissue and cardiac tissue.
13. The composition of claim 12, wherein the tissue is cardiac tissue.
14. The composition of claim 13, wherein the cardiac tissue is abnormal.
15. The composition of claim 14, wherein the abnormal cardiac tissue is selected from the group consisting of diseased myocardial tissue, damaged myocardial tissue, diseased valve tissue, damaged valve tissue, diseased cardiovascular tissue and damaged cardiovascular tissue.
16. The composition of claim 1, further comprising a pharmaceutically acceptable carrier.

17. A nucleic acid encoding a polypeptide for delivering
and/or affixing a stem cell to a target tissue,
which polypeptide comprises a first moiety that
specifically binds to the stem cell surface operably
5 affixed to a second moiety that specifically binds
to the surface of a cell in the tissue.
18. The nucleic acid of claim 17, wherein the nucleic
acid is DNA or RNA.
- 10 19. The nucleic acid of claim 18, wherein the nucleic
acid is DNA.
20. The nucleic acid of claim 17, wherein the nucleic
15 acid is an expression vector.
21. The nucleic acid of claim 20, wherein the vector is
selected from the group consisting of a plasmid, a
cosmid, a bacteriophage and a eukaryotic virus.
- 20 22. The nucleic acid of claim 21, wherein the eukaryotic
virus is an adenovirus or a retrovirus.
23. A host-vector system comprising a host cell
25 transfected with the expression vector of claim 20.
24. A method for producing a polypeptide useful for
delivering and/or affixing a stem cell to a target
tissue, which polypeptide comprises a first moiety
30 that specifically binds to the stem cell surface
operably affixed to a second moiety that
specifically binds to the surface of a cell in the
tissue, which method comprises (a) culturing the

host-vector system of claim 23 under conditions permitting the expression of the polypeptide, and (b) recovering the polypeptide so expressed.

- 5 25. An article of manufacture for delivering and/or affixing a stem cell to a target tissue via juxtaposition of the article to the target tissue, comprising a solid substrate having operably affixed thereto a composition of matter comprising a moiety
10 that specifically binds to the stem cell surface.
26. The article of claim 25, wherein the solid substrate is biodegradable.
- 15 27. The article of claim 25, wherein the solid substrate comprises a polymer.
28. The article of claim 25, wherein the solid substrate comprises an agent selected from the group
20 consisting of fibrin, vicryl, hyaluronic acid, polyethylene glycol, polylactic acid, polylactic-co-glycolic acid, collagen, thrombospondin, teflon, osteopontin and fibronectin.
- 25 29. The article of claim 28, wherein the agent is teflon.
30. The article of claim 28, wherein the article is in the form of gauze, a bandage, suture, a stent, an
30 implant or a polymeric matrix.
31. The article of claim 25, wherein the composition of matter affixed to the solid substrate further

comprises a second moiety that specifically binds to the surface of a cell in the tissue.

5 32. The article of claim 25, wherein the moiety is an antigen-binding portion of an antibody.

33. The article of claim 32, wherein the antigen-binding portion is a Fab fragment.

10 34. The article of claim 32, wherein the composition comprises a bi-specific antibody.

15 35. The article of claim 31, wherein the composition comprises a single polypeptide chain comprising the first and the second moieties.

20 36. The article of claim 25, wherein the composition comprises a recombinantly produced polypeptide chain.

37. The article of claim 31, wherein the first and second moieties are affixed via a chemical moiety.

25 38. The article of claim 31, wherein the first and second moieties are affixed via a polypeptide moiety.

30 39. The article of claim 25, wherein the stem cell is mammalian.

40. The article of claim 39, wherein the stem cell is a CD34⁺ cell.

41. The article of claim 39, wherein the stem cell is an embryonic stem cell.
42. The article of claim 25, wherein the target tissue
5 is selected from the group consisting of hepatic tissue, epithelial tissue, connective tissue, articular tissue, bone tissue, muscle tissue, neuronal tissue, skin, endothelial tissue and cardiac tissue.
- 10 43. The article of claim 42, wherein the tissue is cardiac tissue.
44. The article of claim 43, wherein the cardiac tissue
15 is abnormal.
45. The article of claim 44, wherein the abnormal cardiac tissue is selected from the group consisting of diseased myocardial tissue, damaged myocardial
20 tissue, diseased valve tissue, damaged valve tissue, diseased cardiovascular tissue and damaged cardiovascular tissue.
46. A method for delivering and/or affixing a stem cell
25 to a subject's target tissue comprising contacting the tissue with the stem cell and a composition of matter comprising a first moiety that specifically binds to the stem cell surface operably affixed to a second moiety that specifically binds to the surface
30 of a cell in the tissue.
47. The method of claim 46, wherein the subject is a mammal.

48. The method of claim 47, wherein the mammal is selected from the group consisting of a cow, a horse, a sheep, a pig, a dog, a cat, a rodent and a primate.
49. The method of claim 48, wherein the subject is a human.
50. The method of claim 46, wherein the contacting is performed *ex vivo*.
51. The method of claim 46, wherein the contacting is performed *in vivo*.
52. The method of claim 46, wherein the stem cell and composition of matter are first contacted with each other so as to permit the formation of a complex therebetween, and the resulting complex is contacted with the target tissue.
53. The method of claim 52, wherein the complex is contacted with the target tissue via topical administration.
54. The method of claim 52, wherein the complex is contacted with the target tissue via intravenous administration.
55. The method of claim 46, wherein the first and second moieties are antigen-binding portions of an antibody.

56. The method of claim 55, wherein the antigen-binding portions are Fab fragments.
57. The method of claim 46, wherein the composition
5 comprises a bi-specific antibody.
58. The method of claim 46, wherein the composition comprises a single polypeptide chain comprising the first and the second moieties.
- 10 59. The method of claim 46, wherein the composition comprises a recombinantly produced polypeptide chain.
- 15 60. The method of claim 46, wherein the first and second moieties are affixed via a chemical moiety.
61. The method of claim 46, wherein the first and second moieties are affixed via a polypeptide moiety.
- 20 62. A method for delivering and/or affixing a stem cell to a subject's target tissue comprising, in no particular order, the steps of (a) juxtaposing to the tissue an article of manufacture comprising a
25 solid substrate having operably affixed thereto a composition of matter comprising a moiety that specifically binds to the stem cell surface, and (b) contacting the article with the stem cell.
- 30 63. The method of claim 62, wherein the article is contacted with the stem cell via topical administration of the stem cell.

64. The method of claim 62, wherein the article is contacted with the stem cell via intravenous administration of the stem cell.
- 5 65. A method for delivering and/or affixing a stem cell to a subject's target tissue comprising juxtaposing to the tissue an article of manufacture comprising (a) a solid substrate having operably affixed thereto a composition of matter comprising a moiety
10 that specifically binds to the stem cell surface, and (b) the stem cell bound to the article via the composition of matter affixed thereto.
66. The method of claim 65, wherein the solid substrate
15 is biodegradable.
67. The method of claim 65, wherein the solid substrate comprises a polymer.
- 20 68. The method of claim 67, wherein the solid substrate comprises an agent from the group consisting of fibrin, vicryl, hyaluronic acid, polyethylene glycol, polylactic acid, polylactic-co-glycolic acid, collagen, thrombospondin, teflon, osteopontin
25 and fibronectin.
69. The method of claim 68, wherein the agent is teflon.
70. The method of claim 65, wherein the article is in
30 the form of gauze, a bandage, suture, a stent or a polymeric matrix.
71. The method of claim 65, wherein the composition

affixed to the solid substrate further comprises a second moiety that specifically binds to the surface of a cell in the tissue.

- 5 72. The method of claim 65, wherein the moiety is an antigen-binding portion of an antibody.
73. The method of claim 72, wherein the antigen-binding portion is a Fab fragment.
- 10 74. The method of claim 65, wherein the composition comprises a bi-specific antibody.
- 15 75. The method of claim 65, wherein the composition comprises a single polypeptide chain comprising a first and second moiety which specifically bind to the stem cell surface and tissue cell surface, respectively.
- 20 76. The method of claim 65, wherein the composition comprises a recombinantly produced polypeptide chain.
- 25 77. The method of claim 71, wherein the first and second moieties are affixed via a chemical moiety.
78. The method of claim 71, wherein the first and second moieties are affixed via a polypeptide moiety.
- 30 79. The method of claim 65, wherein the subject is a mammal.
80. The method of claim 79, wherein the mammal is

selected from the group consisting of a cow, a horse, a sheep, a pig, a dog, a cat, a rodent and a primate.

5 81. The method of claim 80, wherein the subject is a human.

82. The method of claim 65, wherein the stem cell is mammalian.

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83. The method of claim 82, wherein the stem cell is a CD34⁺ cell.

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84. The method of claim 82, wherein the stem cell is an embryonic stem cell.

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85. The method of claim 65, wherein the target tissue is selected from the group consisting of hepatic tissue, epithelial tissue, connective tissue, articular tissue, bone tissue, muscle tissue, neuronal tissue, skin, endothelial tissue and cardiac tissue.

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86. The method of claim 85, wherein the target tissue is cardiac tissue.

87. The method of claim 86, wherein the cardiac tissue is abnormal.

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88. The method of claim 87, wherein the abnormal cardiac tissue is selected from the group consisting of diseased myocardial tissue, damaged myocardial tissue, diseased valve tissue, damaged valve tissue,

diseased cardiovascular tissue and damaged
cardiovascular tissue.

89. A composition of matter comprising (a) a stem cell
5 to be delivered to and/or affixed to a target
tissue, and (b) a composition of matter comprising a
first moiety that specifically binds to the stem
cell surface operably affixed to a second moiety
that specifically binds to the surface of a cell in
10 the tissue.
90. A kit comprising the composition of matter of claim
1 and instructions for using same to deliver and/or
affix a stem cell to a target tissue.
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91. A kit comprising the article of manufacture of claim
25 and instructions for using same to deliver and/or
affix a stem cell to a target tissue.

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